

- 1 10. The vaccine strain according to claim 8 wherein the animal is a fish.
- 1 11. The vaccine strain according to claim 8 wherein the animal is a bivalve.
- 1 12. The vaccine strain according to claim 8 wherein the animal is a crustacean.
- 1 13. The vaccine strain according to claim 8 wherein the mutation is non-revertible.
- 1 14. The vaccine strain according to claim 13 wherein the mutation is an insertion.
- 1 15. The vaccine strain according to claim 13 wherein the mutation is a deletion.
- 1 16. A method for immunizing an animal against *V. anguillarum* infection in an animal which
2 comprises:
3 administering to the animal a vaccine comprised of a live, attenuated strain of
4 *V. anguillarum*, the strain comprised of a mutated *mugA* gene, the strain characterized in that it is
5 incapable of expressing a functional *mugA* protein as a result of the mutation in the *mugA* gene.
- 1 17. The method according to claim 16 wherein administering comprises immersion.
- 1 18. The method according to claim 16 wherein administering comprises intraperitoneal
2 injection.
- 1 19. The method according to claim 16 wherein administering comprises oral intubation.
- 2 20. The method according to claim 16 wherein administering comprises anal intubation.

1 21. The method according to claim 16 wherein administering comprising immersing the
2 animal in a medium containing the attenuated strain.

1 22. The method according to claim 16 wherein the animal is a fish.

1 23. The method according to claim 16 wherein the animal is a bivalve.

1 24. The method according to claim 16 wherein the animal is a crustacean.

1 25. The method according to claim 16 wherein the mutation in the *mugA* gene is non-
2 revertible.

1 26. The method according to claim 25 wherein the mutation in the *mugA* gene is an insertion.

1 27. The method according to claim 25 wherein the mutation in the *mugA* gene is a deletion.

1 28. A method of inducing an immune response in an animal against one or more pathogens
2 which comprises transforming a live, attenuated strain of *V. anguillarum*, the strain characterized
3 in that it is incapable of expressing a functional *mugA* protein, with a plasmid comprising DNA
4 of interest encoding at least one protein antigen for each of the pathogens and administering the
5 transformed strain to an animal.

1 29. A method for the detection of the presence of *V. anguillarum* in animal tissue or fluids
2 comprising:

3 contacting the sample with a detectably labeled DNA probe wherein the probe comprises
4 a detectable single-stranded DNA having a nucleotide sequence which specifically and

5 selectively hybridizes with DNA of *V. anguillarum* , the DNA probe comprising a nucleotide
6 sequence selected from the group consisting of SEQ ID NO. 1, whereby the presence of the
7 DNA is indicative of a *V. anguillarum* infection.